Integrated GPS Module for Workabout Pro

DATASHEET

WORKABOUT PRO

PSION TEKLOGIX
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I. Preface

I.1. Scope

This document gives all the information necessary for users to evaluate and use the integrated GPS module for WORKABOUT PRO hand-held computers.

I.2. Terminology

API	Application Programming Interface
GPS	Global Positioning System
NMEA 0183	ASCII based standard data communication protocol used by GPS receivers
UBX Protocol	A proprietary binary protocol used by the ANTARIS™ GPS technology
Workabout PRO	WorkAbout Pro Hand-held computer from PSION Teklogix

I.3. Reference document

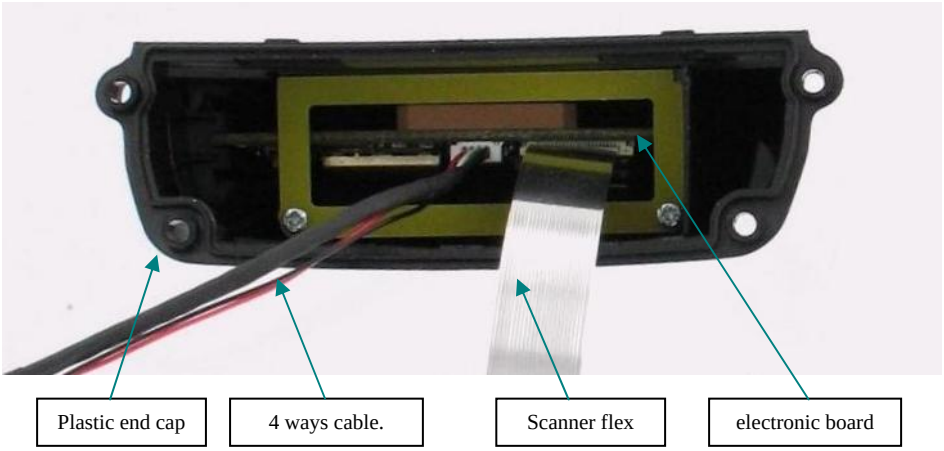
Document	Reference	Version	Date
ANTARIS® 4 GPS Modules Datasheet	GPS.G4-MS4-06143-1	1	05/25/2007

II. Module presentation

II.1. Form factor – Ordering information

The integrated GPS module is made of a GPS receiver board embedded in the multipurpose endcap:

- P/N 1051350 for the GSM compatible version
- P/N 1051355 for the stylus version



II.2. Compatibility

The integrated GPS module can be used with WORKABOUT PRO G1 or G2 computers, and is compatible with short and long version.

II.3. Connectivity

The integrated GPS module can be connected to the WORKAB OUT PRO motherboard:

- Using the scanner flex cable; in that case, the connection can be configured as a serial or USB connection, and the original flex cable is replaced by a 6 inch flex cable.
- Using a 4-way USB cable, on WORKABOUT G2 computer.

The module is delivered with both connection options (6 inch flex cable and 4-way cable). The user has to remove the unneeded one.

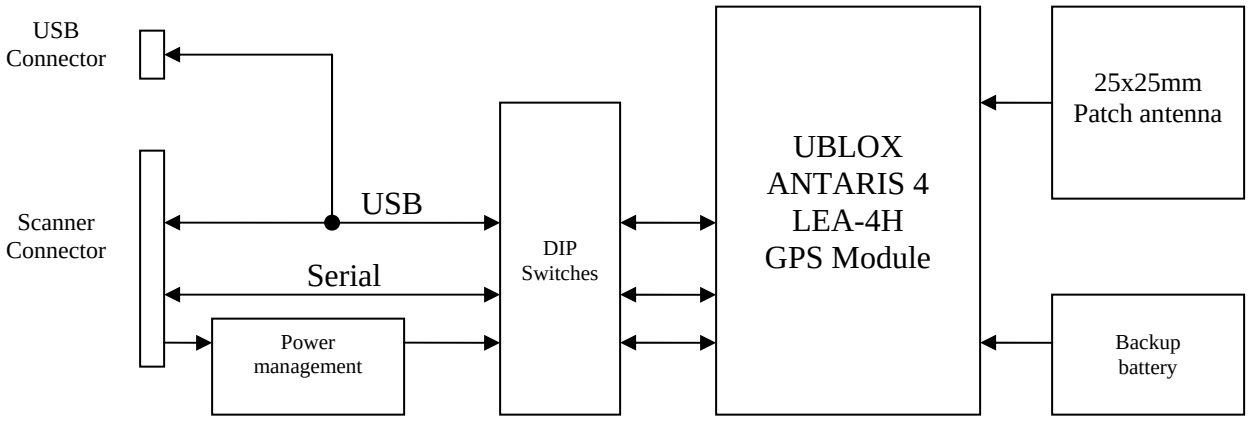
II.4. GPS features

The uBlox GPS module is used. Its main features are:

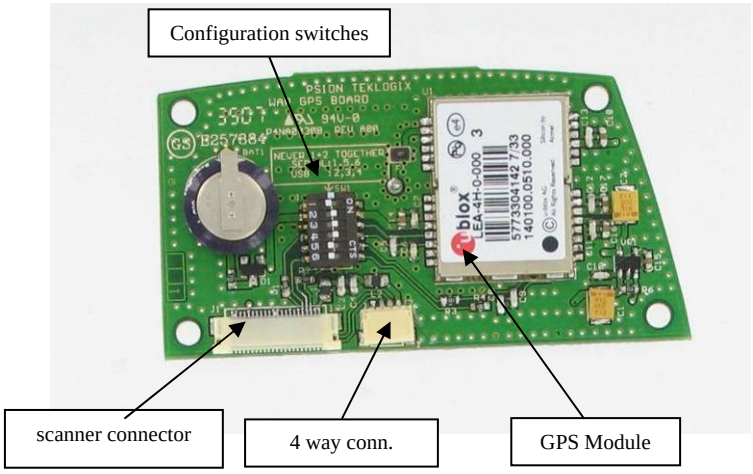
- 1 USB and 1 UART port
- 4 Hz position update rate
- 16 channel ANTARIS 4 positioning engine
- SuperSense® Indoor GPS
- A-GPS and Autonomous GPS operation, AssistNow™ ready
- Supports DGPS, WAAS, EGNOS and MSAS
- Supports NMEA, UBX and RTCM protocols
- Power saving modes

III. Module Specification

III.1. Block Diagram



GPS Module Block diagram



Electronic board Components side

III.2. Description

III.2.1. GPS antenna

The GPS module has an embedded passive patch ceramic antenna. No external antenna connection is required.

III.2.2. Power management

Power for the board comes from:

- +5V_BAR if scanner flex cable is used
- VDD_USB (5V) if 4-way cable is used.

The board is turned off:

- when connected to scanner flex cable:
  - if +5V_BAR is turned off
  - if Power_enable pin is driven low.
- When connected to 4-way cable
  - If VDD_USB is turned off

Refer to chapter V.1 for information on how software can manage the power to the board.

III.2.3. Backup battery

A backup battery allows the UBLOX LEA-4H module to recover from power down mode with either a Hotstart or a Warmstart (depending on the duration of VCC outage) and to maintain the configuration settings.
The capacity of the backup battery allows a VCC outage of 30 hours.

III.2.4. Communication setup

The communication link with the module can be set up with either serial or USB link. Refer to chapter VI.2 to know how to change the module configuration.

In both cases, the link seen by the operating system of the computer is a serial link.

III.3. GPS functions

For details on GPS functions, please refer to ANTARIS® 4 GPS Modules Datasheet Ref. GPS.G4-MS4-06143-1.

III.4. Electrical specification

Absolute Maximum Rating(1)

Supply Voltage	0 to +7V
Operating temperature	-20°C/+60°C
Storage temperature	-40°C/+85°C

Operating ratings(2)

Supply Voltage	4.75 to +5.25V
Operating temperature	-20°C/+60°C
Storage temperature	-40°C/+85°C

Electrical Characteristics

VDD_USB=5V, T=25°C unless noted

Symbol	Parameter	Condition	Min	Typ	Max	Units
Power Supply						
VDD_USB +5V_BAR	Power supply voltage		4.75	5	5.25	V
IDD	Quiescent Supply Current	Charging current(3) (4)		70	350	mA
		Full power State(3)		40		mA
		Sleep State(3)		65		µA
		Backup state(3)		5		µA

Notes:
1. Exceeding the absolute maximum rating may damage the device.
2. The device is not guaranteed to function outside its operating rating.
3. To be confirmed.
4. Charging current is due to Backup battery charging. Duration after power up is less than 2mn.

III.5. Connector Pinout

III.5.1. J1 : scanner connector

Pin number	Name	Direction	Description
1,2	V+5_BAR	Power	+5V barcode supply
3	RXD	Input	From WORKABOUT PRO to GPS board if R17 fitted
4	USB D-	Bidirectional	If R15 fitted and VDD USB switched on
5	TXD	Ouput	From GPS board to WORKABOUT PRO if R18 fitted
6	USB D+	Bidirectional	If R16 fitted and VDD USB switched on
8,11,12, 21,22	GND	Power	Ground
18	Power_enable	Input	0: Off / 1: On

III.5.2. J2 : USB connector

Pin number	Name	Direction	Description
1	GND	Power	Ground
2	USB D+	Bidirectional	USB Bus
3	USB D-	Bidirectional	USB Bus
4	VDD USB	Power	From WORKABOUT PRO to GPS

III.5.3. Configuration switches

Switch number	Function	ON	OFF
1	VDD_USB_GND	VDD USB is connected to GND on the module (USB disabled) **Never 1 and 2 together ON**	VDD USB is not connected to GND
2	VDD USB	VDD USB is connected to 3V3 **Never 1 and 2 together ON**	VDD USB is not connected to 3V3
3	USB D+	USB D+ of the module connected to USB D+ on the scanner and 4-way connectors	USB D+ is open on the GPS module
4	USB D-	USB D- of the module connected to USB D- on the scanner and 4 way connectors	USB D- is open on the GPS module
5	RXD	Connects RXD line between the WORKABOUT PRO and the GPS module	RXD line is open on the GPS module
6	TXD	Connects RXD line between the WORKABOUT PRO and the GPS module	TXD line is open on the GPS module

Serial connection configuration
USB connection configuration

IV. Quick Start User Guide

IV.1. Hardware installation

Easily installable expansion modules for the WORKABOUT PRO allow you to customise this hand-held to meet your specific mobile computing requirements. This chapter outlines how to install the Integrated GPS Module.

IV.1.1. Module configuration

The integrated GPS Module can communicate with the Workabout Pro through:

- a serial link
- a USB link

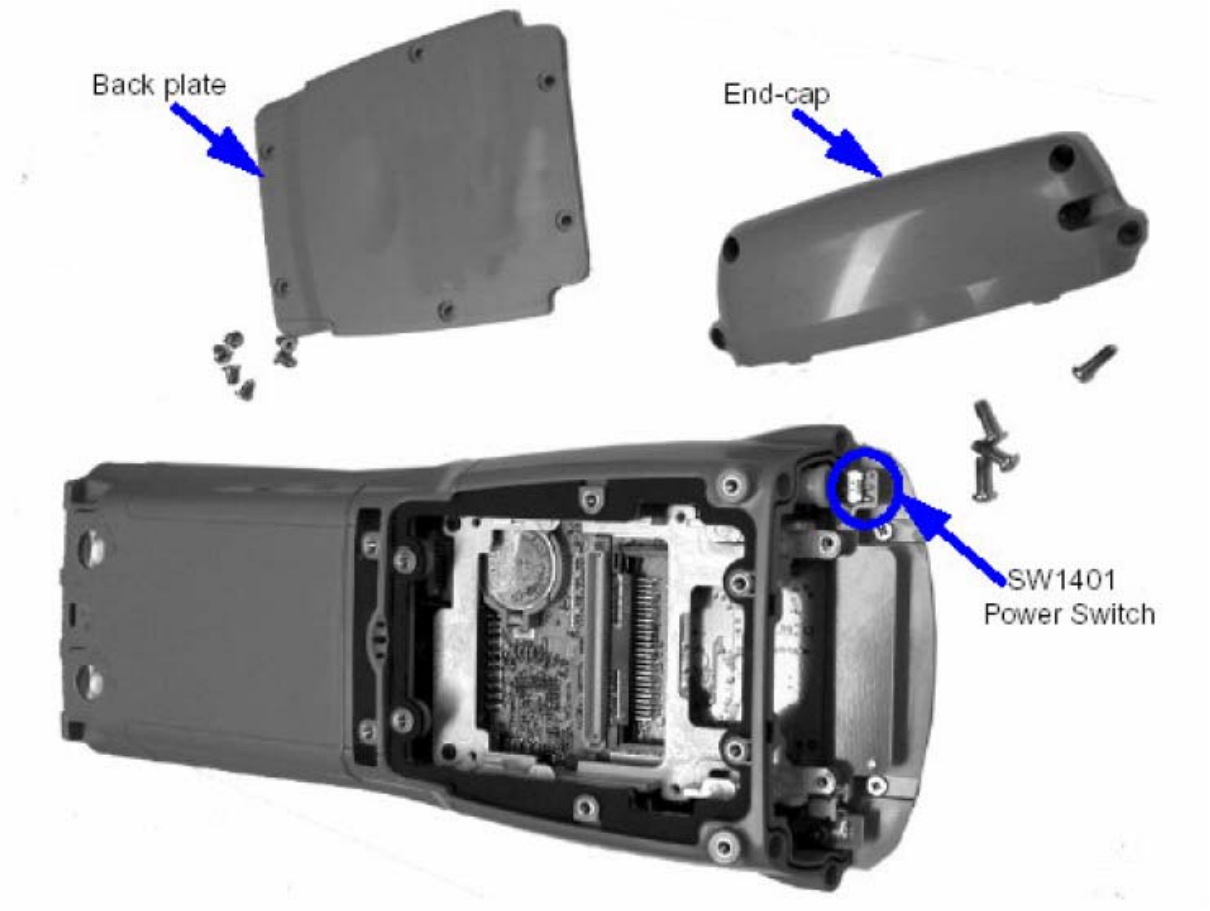
Factory settings set up the USB communication and the module can be used either with the scanner flex cable or the 4-way USB cable.

If user wants to use the scanner flex cable and the serial link, DIP-switches on the electronic board of the module have to be set up, meaning that the module has to be unassembled.
Refer to chapter VI.2 to know how to change the module configuration.

IV.1.2. On a Workabout Pro G1

On Workabout Pro G1 computers, the only way to connect the GPS module is via the scanner flex cable. Refer to chapter IV.1.1 if you want to change the communication setting (USB by default).

To install a module, you will need to remove the endcap and back plate on the WORKABOUT PRO. This is a simple process of unfastening four screws on the endcap and six screws on the back plate.



Before installing a module in the WORKABOUT PRO, all power sources must be turned off.

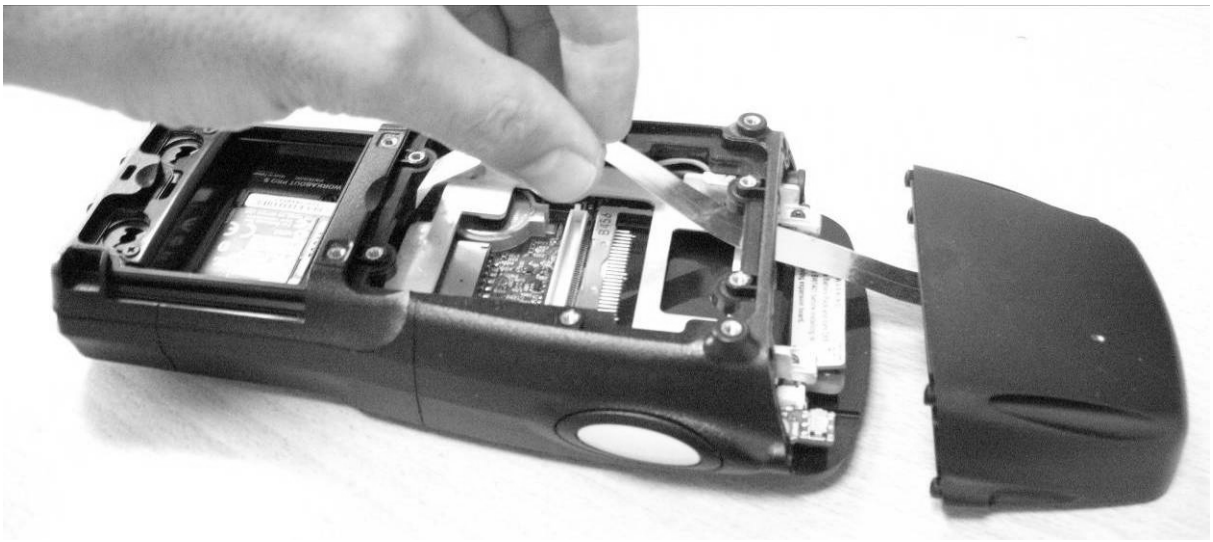
- Remove the batteries. If your unit is using AC power, disconnect it.
- Slide the SW1401 switch to the left to shut off internal battery power.

You will then have to disconnect the scanner flex cable.
The scanner connector is located on the main logic board of the WORKABOUT PRO, near the coin cell. The connector on the WORKABOUT PRO motherboard is a 22-pin connector.

Location Of The Scanner Connector

On the GPS Module, take off the 4-way cable.

Place the endcap on the top of the Workabout Pro and connect the 6 inch flex cable in the scanner connector.



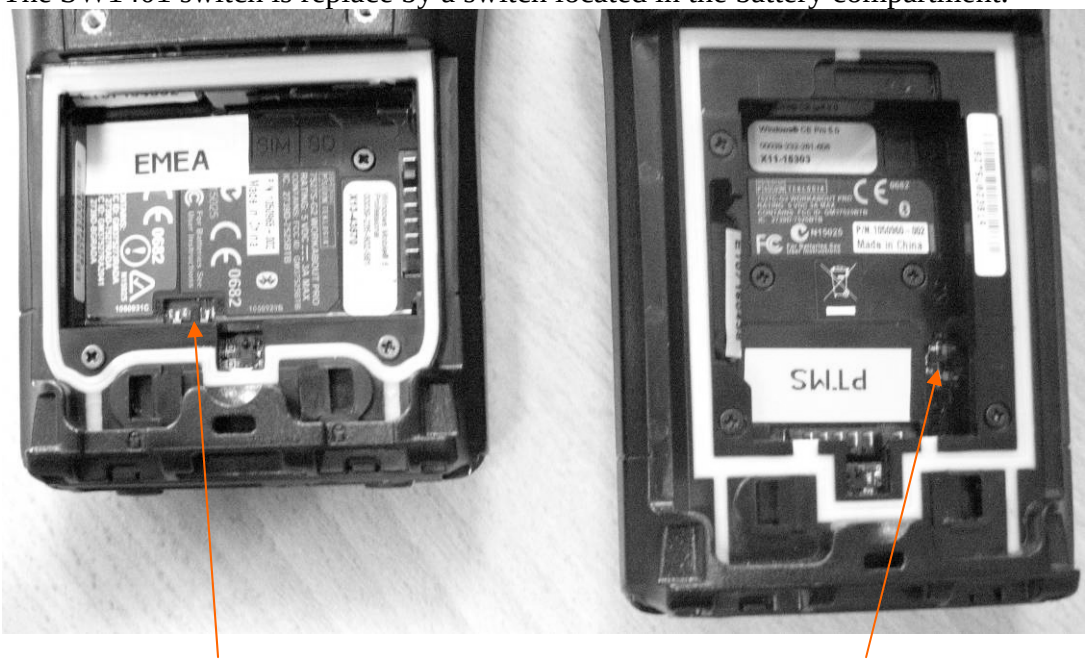
Slide the SW1401 switch to the right to turn power back on.
Replace the endcap, back plate and batteries.

IV.1.3. On a Workabout Pro G2 via flex cable

On Workabout Pro G2 computers, you can connect the GPS module either via the scanner flex cable or a 4-way cable. This paragraph describes the scanner flex cable connection. Refer to chapter IV.1.1 if you want to change the communication setting (USB by default).

The procedure is exactly the same as in chapter IV.1.2 except:

The SW1401 switch is replace by a switch located in the battery compartment.

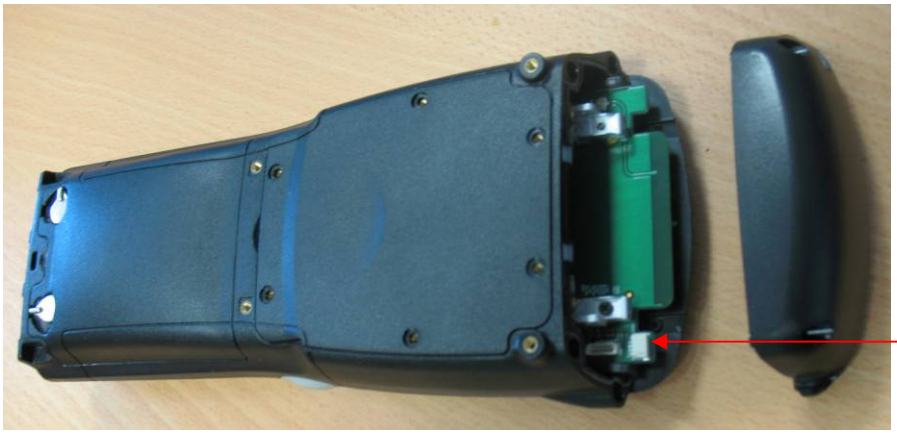


Power Switch on WORKABOUT PRO G2S

Power Switch on WORKABOUT PRO G2C

IV.1.4. On a Workabout Pro G2 via 4-way cable

To install a module, you will need to remove the endcap on the WORKABOUT PRO. This is a simple process of unfastening four screws on the endcap



Make sure the WORKABOUT PRO is in suspend mode.

On the GPS module take off the scanner flex cable.

Connect the 4-way cable to the USB connector of the Workabout Pro.

Replace the endcap.

IV.2. Demo Software installation

This part describes how to install and configure the GPS module on your device. To test this module we provide on the Psion Teklogix web site a demonstration tool called PT GPS. Other GPS applications can be configured with the same procedure, but for software development we advise you to refer to the “V. Developer guide” section.

IV.2.1. GPS module installation

With this document, we provide a setup package “GPSModuleSetup v1.2”. Follow this instruction to install it:

1. Copy the folder “GPSModuleSetup v1.2” onto your device.
2. Execute “Setup.exe”.
3. The installation process asks you first if the GPS is connected to the scanner port. If you use this connection the program installs a driver to switch on the scanner power. Else the USB expansion slot is enabled in the registry.
4. Then the second dialog box asks you if the GPS use the USB communication mode (USB is the factory configuration). If you answer “yes”, the USB driver is installed.
5. Click on “OK” to reboot the system.

IV.2.2. Software installation

The PT GPS application provided by Psion Teklogix is intended to show all the GPS features and facilitates the GPS board evaluation. You can download it on the Psion Teklogix Partner Database site and install the cab file corresponding to your operating system on your device. If you want to know more about this application, see the document PT GPS User Manual.

Any other demo application for mobile devices can be used with this GPS.

IV.2.3. Software configuration

To configure your GPS software, you need to set the serial port settings as follow:

- The baud rate is always 9600bps
- For serial communication mode on the scanner port, the port number is COM3
- For USB communication mode a serial port is emulated, and the port number COM5 is assigned automatically. If your configuration already uses the COM5 for another peripheral, you can modify the default GPS port number in the registry, please refer to the “V.3.2 GPS with USB communication mode” section for help. Once the right port is selected the background colour of PT GPS application becomes yellow or green.

V. Developer's guide

This guide is about GPS power management, USB driver installation and communication settings. In this document we will not discuss how to manage the NMEA sentences. If you want more information about that, there is a lot of documentation and SDK on Internet.

V.1. Power management

According to your application, it could be useful to manage the GPS power to save battery life. To implement it, the WORKABOUT PRO HDK V2.01 available on the Psion Teklogix site is required.
All the source code here is in C++ language, but a .Net wrapper for the HDK can be downloaded on the Psion Teklogix Partner Database.

V.1.1. GPS on scanner flex cable

- Switch ON GPS:

To enable GPS power on the scanner port, use the function ScannerPort:EnablePower(bool on) from the HDK API with the parameter "on" to true, and set the pin OutputBarWakeup to true.

- Switch OFF GPS

To disable GPS power on the scanner port, use the function ScannerPort:EnablePower(bool on) with the parameter "on" to false, and set the pin OutputBarWakeup to false.

Sample code:

```
using namespace PsionTeklogix::WORKABOUTPRO_HDK::ScannerPort;
using namespace PsionTeklogix::WORKABOUTPRO_HDK;

void SwitchOnGPS() {
	// Switch on the 5V on the scanner port
	ScannerPort::EnablePower(true);

	// Set the BarWakeup pin (pin 18) to 1
	Configure((ScannerPin) OutputBarWakeup, true);
	SetPinState(static_cast<ScannerPin>(OutputBarWakeup), true);
	Configure((ScannerPin) OutputBarWakeup, false);
}

void SwitchOffGPS() {
	// Switch off the 5V on the scanner port
	ScannerPort::EnablePower(false);

	// Set the BarWakeup pin (pin 18) to 0
	Configure((ScannerPin) OutputBarWakeup, true);
	SetPinState(static_cast<ScannerPin>(OutputBarWakeup), false);
	Configure((ScannerPin) OutputBarWakeup, false);
}
```

V.1.2. GPS on expansion USB connector

- Switch ON GPS

To enable GPS power on the expansion USB connector, use the function ExpansionUSB:EnablePower(bool on) from the HDK API with the parameter “on” to true.

- Switch OFF GPS

To disable GPS power on the expansion USB connector, use the function ExpansionUSB:EnablePower(bool on) with the parameter “on” to false.

Sample code:

```
using namespace PsionTeklogix::WORKABOUTPRO_HDK::ScannerPort;
using namespace PsionTeklogix::WORKABOUTPRO_HDK;

void SwitchOnGPS() {
      // Switch on the 5V on the expansion USB connector
      ExpansionUSB::EnablePower(true);
}

void SwitchOffGPS() {
      // Switch off the 5V on the expansion USB connector
      ExpansionUSB::EnablePower(false);
}
```

V.1.3. WORKABOUT PRO USB hub

Even if your GPS board is powered, you must check that the USB Hub into the Psion Teklogix hand-held computer is switch on. Use these functions to switch the USB Hub power:

- Switch ON USB hub

To enable USB hub power, call the function USBHub:EnablePower(bool on) from the HDK API with the parameter “on” to true.

- Switch OFF USB hub

To disable USB hub power on the expansion USB connector, call the function USBHub:EnablePower(bool on) with the parameter “on” to false.

Sample code:

```
using namespace PsionTeklogix::WORKABOUTPRO_HDK;

void SwitchOnUSBHub() {
      USBHub::EnablePower(true);
}

void SwitchOffUSBHub () {
      USBHub::EnablePower(false);
}
```

V.2. USB driver installation

On the GPS board a block of 6 switches configure the communication mode. If your GPS switches are set to USB, it is necessary to install the UBlox driver on the WORKABOUT PRO else, it will display a message box “Unidentified USB Device”.
To install the driver you can launch “PsionTeklogix UBLOX_Setup.cab” available in the folder “cab” of the “GPSModuleSetup v1.2” package or create your own setup file.

If you choose to do it yourself, you have to copy the driver UBXUSBSER.dll in the “\Windows” folder and add the following registry keys:
HKLM\Drivers\USB\LoadClients\5446_420_256\Default\Default\UBXUSBSER\FriendlyName, with the value "Antaris(r)4 - GPS Receiver"
HKLM\Drivers\USB\LoadClients\5446_420_256\Default\Default\UBXUSBSER\DeviceType, with the value 1
HKLM\Drivers\USB\LoadClients\5446_420_256\Default\Default\UBXUSBSER\Tsp, with the value "Unimodem.dll"
HKLM\Drivers\USB\LoadClients\5446_420_256\Default\Default\UBXUSBSER\Prefix, with the value "COM"
HKLM\Drivers\USB\LoadClients\5446_420_256\Default\Default\UBXUSBSER\Dll, with the value "UBXUSBSER.dll"

V.3. Connection settings

The GPS device is accessible through a serial port even if the USB communication mode is used (the UBlox USB driver emulates a serial port).

The baud rate is allways 9600bps.

V.3.1. GPS with serial communication mode

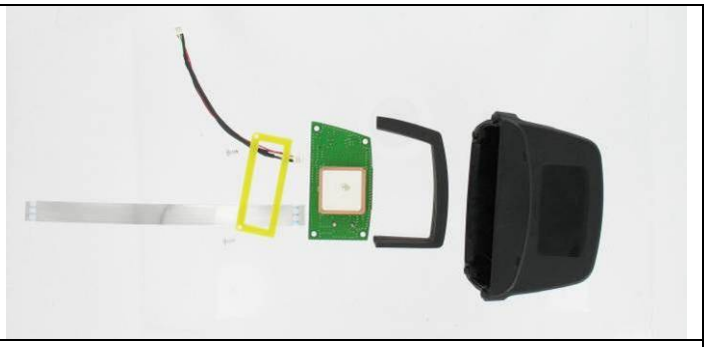
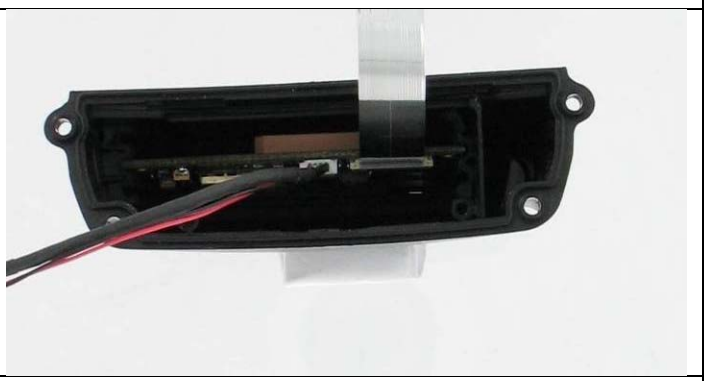
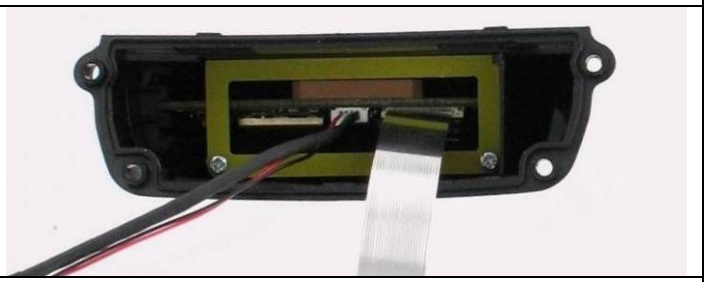
The port number is COM3 for serial communication mode on the scanner port.

V.3.2. GPS with USB communication mode

For USB communication mode, the port number is automatically assigned to the COM5. But other port can be used by changing the registry key HKLM\Drivers\USB\LoadClients\5446_420_256\Default\Default\UBXUSBSER \Index with the value of the port number 1, 2, 4 or 5 (the COM3 is never available for USB device).
Keep in mind that some port number are already used by the system and could not be assigned for the GPS.

VI. Maintenance

VI.1. Endcap assembly

Here are all the required parts	
Fit the GPS board in the rubber boot Set up the switches to desired configuration (USB (default) or Serial)	
Fit the assembly in the multipurpose endcap (with the FFC and the 4-way connector connected)	
Screw the stopper in place	

This is a view of the assembled unit	

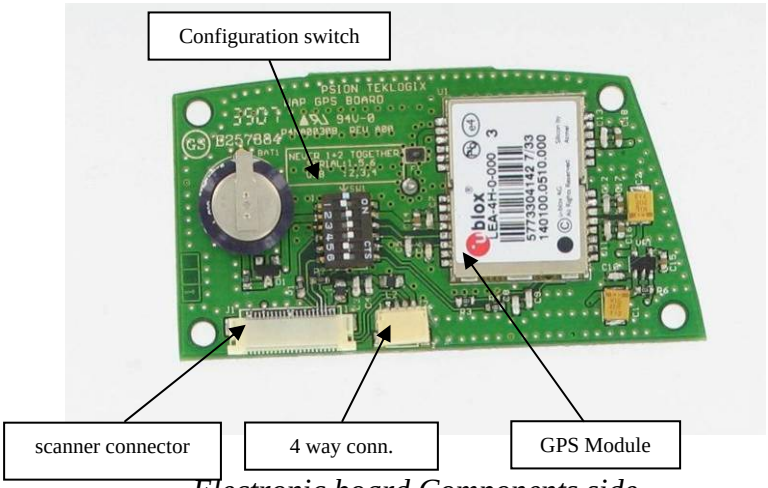
VI.2. Communication Setup

VI.2.1. USB Link

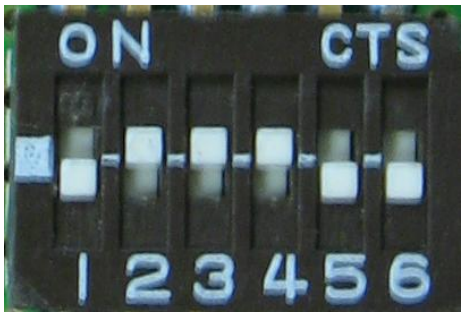
This is the default setup for the module.

Follow instructions of chapter VI.1 to assemble and disassemble the endcap.

In order to set up the communication of the GPS module through the USB link, DIP switches on the board must be set up as shown:



Electronic board Components side



DIP Switches configuration for serial communication

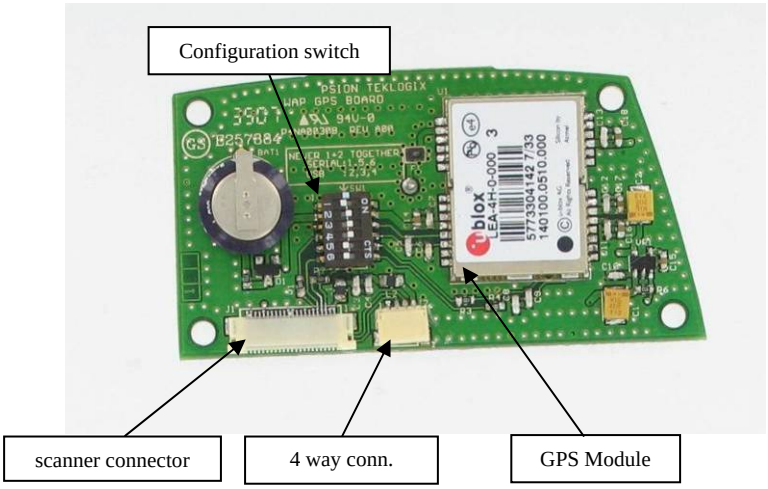
Never turn on switches 1 and 2 together. Permanent damage of the board would happen.

VI.2.2. Serial Link

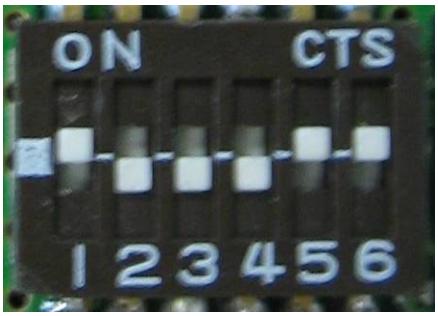
This is the non-default setup for the module.

Follow instructions of chapter VI.1 to assemble and disassemble the endcap.

In order to set up the communication of the GPS module through the serial link, DIP switches on the board must me set up as shown:



Electronic board Components side



DIP Switches configuration for serial communication

Never turn on switches 1 and 2 together. Permanent damage of the board would happen.